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The Future of U.S. Naval Mines

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INSTITUTE FOR DEFENSE ANALYSES

IDA Paper P-3326

The Future of U.S. Naval Mines

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PREFACE

This analysis was conducted by IDA's System Evaluation Division (SED) in response to a request by the Office of the Under Secretary of Defense for Acquisition and Technology, Deputy Director, Naval Warfare.¹

The analysis represents a detailed summary of the wide-ranging discussions of an expert panel convened at IDA to discuss the topic of the study. The guidance and suggestions of Dr. David L. Randall, Director of the System Evaluation Division, and of General Larry D. Welch (USAF, Ret.), President of IDA are gratefully appreciated. Special thanks are due the Center for Naval Analyses, which made possible, through funding from the Expeditionary Warfare Division of the Deputy Chief of Naval Operations for Resources, Warfare Requirements and Assessments, the extensive contributions to the study from Mrs. Sabrina Edlow. Mr. John F. Donahue edited the paper.

¹ *The Future of U.S. Naval Mines*, Contract DASW01-94-C-0054, Task T-E1-1443, 5 March 1997, UNCLASSIFIED.

THE FUTURE OF U.S. NAVAL MINES

The United States Navy spends approximately \$6M a year for research and development of naval mines. This small amount of money falls far short of what would be required to produce a new generation of mines designed to operate in the new strategic environment. The Navy does not appear to be planning to increase this level of R&D spending any time soon.

However, this white paper argues that current funding should be increased because modern naval mines have a significant role to play in support of national security planning and military operations in the post-Cold War era. At its foundation lies work done by the Institute for Defense Analyses (IDA) and the insights provided by a senior panel expressly convened to discuss the future of naval mines in the United States Navy. The Senior Panel was moderated by General Larry D. Welch, USAF (Ret), the President of IDA, and consisted of the following people:

The Honorable Richard Cheney
Dr. Richard L. Garwin
The Honorable John O. Marsh, Jr.
The Honorable Robert C. McFarlane
Rear Admiral John M. Poindexter, USN (Ret)
Professor David Rosenberg
General William Y. Smith, USAF (Ret)
Admiral Carlisle A.H. Trost, USN (Ret)
The Honorable Paul Wolfowitz
The Honorable R. James Woolsey
Admiral Ronald J. Zlatoper, USN (Ret).

The panel's deliberations were observed by the following people representing the Navy and the mining community:

James D. Collie, Acting PEO, Mine Warfare
Rear Admiral Dennis R. Conley, Commander, MINEWARCOM
The Honorable John W. Douglass, ASN (RD&A)
Vice Admiral Douglas J. Katz, Commander NAVSURFLANT, for VCNO
Major General Edward Hanlon, Jr., USMC, N-85
Rob R. Fernandez, Director Mine Systems, CSS
Edward Zdankiewicz, DASN (MUW), retired
Dr. Paris Genalis, Deputy Director Naval Warfare OUSD (A&T)
George Leineweber, Naval Warfare OUSD (A&T)

The Senior Panel, which met for one day on the 15th of April, 1997 at IDA, found compelling reasons for developing and maintaining a modern naval mining capability. It therefore recommended that the U.S. Navy stay in the business of developing and manufacturing modern naval mines by replacing present under-funded plans with an imaginative, affordable R&D and procurement program costing approximately \$30M a year.

THE COMPELLING REASONS

The change from the relatively settled strategic environment of the Cold War to today's fluid environment makes the job of preparing for the future difficult. Still, certain trends are likely to continue almost regardless of what the foreseeable future holds. Of these, the panel identified three that have direct relevance to the issue at hand: adversary reliance on mines, adversary reliance on diesel submarines, and the decreasing numbers of U.S. naval forces.

Enemy Mining and the U.S. Mine Countermeasure Posture

The Cold War has left the United States an unchallenged superpower. Under the circumstances, future adversaries will not be inclined to confront us in open combat, preferring instead to challenge us asymmetrically through the use of non-conventional weapons. Naval mines, deployed by our enemies in the littoral waters adjacent to their shores, could serve as such non-conventional weapons. Mines are relatively cheap weapons easily accessible to even the poorest of countries, are widely available on the international arms market, require relatively little operational sophistication to use, and would take significant effort on our part to counter. Therefore, one might expect that future adversaries would employ naval mines against us.

Adversary reliance on naval mines requires that we develop a first-rate mine countermeasure capability. Although the surest way to deal with enemy mines is to prevent their employment, we cannot count on having rules of engagement permissive enough to allow preemptive attacks against the mine stockpiles or the delivery platforms of a potential enemy. Consequently, we must rely upon tedious and time consuming mine clearance operations.

Designing effective mine clearance operations requires a thorough understanding of how mining works. Therefore, even if the United States wanted to divest herself of mines,

she would have to preserve an R&D program sufficient to keep her one step ahead of any country that might choose to use mines against her forces.

However, a vigorous R&D program would be difficult to sustain without a corresponding acquisition program. Experience and current down-sizing pressures suggest that an R&D program alone might soon become unrealistic and would not be likely to survive the funding battle. To keep ourselves smart in mining as a way of providing us with a credible mine countermeasure posture, we must remain in the business of building mines. The panel argued that this realization constitutes a compelling reason for developing a modern naval mining capability.

Enemy Submarines and the U.S. Antisubmarine Warfare Posture

The second relevant trend is the predilection of potential adversaries to acquire diesel submarines. Just as in the case of naval mines, modern diesel-electric submarines are generally available on the market from a variety of nations such as Russia, Germany, Sweden, France, and England. Many of these submarines are acoustically quiet when operating on battery, have a small acoustic cross section, and, with the advent of air-independent propulsion, their endurance could soon be compatible with prolonged submerged operations. Acquisition of diesel submarines should give those countries that can afford to buy them a significant strategic edge over their neighbors as well as the ability to seriously threaten American expeditionary forces directed against their shores.

To control the diesel-electric submarine threat we must develop a first-rate ASW capability. Given the weakness of current ASW forces in many littoral environments, a first-rate ASW capability should, the panel felt, include a first-rate modern mining capability.

Countering the enemy diesel submarine threat in the littorals is a mission well suited to offensive mining for both tactical and technical reasons. Tactically, an appropriately placed minefield could avoid the difficult job of finding and neutralizing enemy submarines by trapping them in port at the beginning of a conflict or, should that prove impossible, by trapping them out of port after conflict has begun. Technically, minefields could be significantly more robust to the environmental vagaries characterizing the littoral than could many other ASW systems. Most importantly, imaginative employment of naval mines may help the ASW effort by enticing enemy submarines into areas where our ASW capability is the best.

Currently, employment of naval mines prior to D-day would be forbidden by international law as well as by our own rules of engagement. However, since it is not expressly forbidden to place unarmed mines in international waters, modern mines with a remote control capability could be deployed at any time provided their detonating mechanism was turned off. This would provide offensive mining with the flexibility of controlling the movement of enemy submarines in times of tension, a capability not possessed by ASW forces.

Decreasing Budgets and the Force Multiplier Effect of Mines

The final relevant trend recognized by the panel was the inexorable decrease in force levels generated by decreasing Defense budgets. With fewer forces, the U.S. Navy may find it increasingly difficult to bring sufficient ASW assets to bear fast enough to control the enemy submarine threat in a timely manner. By using modern mines, one could mitigate the effects of insufficient ASW forces. Not only would timely deployment of minefields supplement ASW ships and aircraft, but, properly employed, they would free multimission platforms from the necessity of conducting ASW operations to the detriment of other missions.

This force multiplier quality of mines has been known for a long time. Even during the Cold War, when we had plenty of money to spend on ASW forces, the CAPTOR mine was developed and a fleet loadout was procured. In the current fiscal environment, however, the force multiplier attribute of mines is bound to become more important.

The arguments adduced above in favor of offensive ASW mining apply with equal force to offensive mining against surface ships. In this case, the use of mines could free up surface surveillance and strike systems to help with expeditionary warfare missions that are likely to drive naval operations in the post-Cold War era.

Diplomatic Uses of Naval Mines

The senior panel considered but dismissed diplomatic use of modern naval mines as a compelling reason for developing and maintaining a mining capability. The proposition considered by the panel envisioned the use of remotely controlled minefields in time of peace to punish rogue behavior on the part of terrorist nations, or in time of increasing tensions to control the bellicose instincts of the belligerent nations.

Regarding the vindictive use of mines, the panel felt that minefields, being weapons that wait, would not be swift enough to administer visible punishment for uncivilized

behavior. Curtailment of enemy maritime movement through the use of minefields would be equivalent to economic sanctions imposed on the country but would probably appear to be more inflammatory than the latter. Regarding the coercive use of mines, the panel felt that minefields would not be viewed as politically acceptable instruments of pre-war dialogue between nations no matter how alarming enemy actions may appear. Such use of mines would rob the United States of the high moral ground from which to chastise rogue nations for their unacceptable behavior in the international arena.

THE CURRENT MINING SYSTEM

Present naval mining capability is out of step with the vision outlined in the panel deliberations. The United States Navy owns about 16,000 naval mines, of which approximately 5,000 are being retired--4,000 Mk 56 moored mines due to old age and 1,000 Mk 60 (CAPTOR) moored mines due to decreased performance capability against diesel submarines in littoral waters. The remaining inventory, consisting of the air-delivered QUICKSTRIKE series of bottom mines and of submarine-launched mobile mines, are not matched to the most likely targets and fail to adequately threaten submarines operating in medium depth water. These mines, lacking as they do any form of a remotely operated tactical control mechanism, would significantly limit the freedom of operation of our own naval forces by denying them those bodies of water that we have previously mined and, in any event, they might attack innocent or friendly traffic.

Existing R&D programs are not likely to change the situation any time soon; they are funded at the level of approximately \$6M a year and are largely focused on developing a highly sophisticated new generation Littoral Sea Mine that the panel believed may be too expensive to acquire. At this level of funding, the mining community might not even be able to develop the reliable remote-control capability the panel felt would definitely be needed in any future warfare.

Delivery capability of naval mines is hardly in better shape. A study recently conducted by the DoD IG found, among other things, that delivery operations could take an unacceptably long time due to recent reductions in Air Force bombers, Navy tactical aircraft, and submarines. This shortage of assets is exacerbated by the high demand generally imposed upon such multimission platforms in time of war.

Another notable weakness of our naval mining capability is the heavy reliance of our delivery capability upon aircraft rather than submarines. While this choice is driven by the natural desire to take advantage of the higher speed and carrying capacity of aircraft,

the choice has considerable drawbacks. To lay current mines in a regional conflict, aircraft would have to fly low over the water in the vicinity of enemy land during hostilities, thus raising the prospects of losing valuable aircraft assets. If the nation had a remotely controlled mine, we would have the option of delivering unarmed mines in time of tension, when the delivery platform would not be in imminent danger of attack, and then arm the minefield as needed after hostilities had begun.

NAVY'S REACTION TO THE SHORTFALL IN CURRENT CAPABILITY

The shortcomings of our current naval mining posture are well known to the U.S. Navy. In response to the above mentioned DoD IG report highlighting these shortfalls, the Navy indicated its general agreement with the report's findings but made it clear that it did not intend to do much about them. With few exceptions, notably the development of the CAPTOR mine, mining has been a low priority mission for the Navy in time of peace and, therefore, the Navy is not likely to increase funding for the development of a modern mine.

This apparent indifference to the insufficiency of our current mining capability represents a traditional position for the United States Navy. In fact, the historic record of Anglo-American navies displays a clear pattern of reluctant support for the development and maintenance of naval mines in times of peace balanced by a pragmatic acceptance of their military utility in times of war.

The persistence of this pattern throughout history bespeaks of equally persistent reasons for its existence. One can argue that these reasons are both cultural and ethical. First, Americans at war prefer overwhelming force to achieve swift and unconditional victory over the enemy, and mine warfare ill fits this instinct. Second, American naval officers are trained in the Mahanian school of complete and unchallenged control of the sea, and naval mines, primarily a sea denial weapon, ill fit that strategic vision. The historic fact that mines have nevertheless been often used in time of war is a consequence of the pragmatic instinct that has driven America to expedient solutions. Third, because mines are often the weapon of choice for weak nations lacking the courage to risk their own forces in a valiant pursuit of victory, Americans tend to view mine warfare as underhanded and akin to terrorism. Finally, the American attitude towards mines in general, and naval mines in particular, is strongly colored by the indiscriminate character of mine warfare. The use of weapons that deliberately ignore the moral imperative of avoiding military action against civilians is ethically disturbing.

THE WAY AHEAD

To move off this ground state position, the Navy must therefore be driven by compelling reasons articulated at the highest levels of decision making both in the Department of Defense and in Congress. To seek such compelling reasons was the explicit objective of the panel of senior executives that met on the 15th of April at IDA. However, given the natural character of the Navy's reluctance to develop mines in peace time, the panel recognized that finding compelling reasons, while essential if we are to maintain a mining capability in the future, would likely not be enough. One would have to also facilitate the decision process by creating a flexible R&D and procurement program aimed at developing effective and affordable modern mines. In particular, the panel felt that an increase from the current funding to approximately \$30M a year ought to be both sufficient and achievable. Consequently, the panel suggested the following:

- A white paper should be prepared outlining the case for modern naval mining and the need for a more vigorous Navy acquisition program. The white paper (which has in fact been produced as the present Paper P-3326) should be briefed and distributed widely within the Navy, the Joint Staff, Unified Commands, the Office of the Secretary of Defense, and Congress.
- Flexible and affordable R&D and procurement program alternatives for the acquisition of modern naval mines should be developed to include:
 - improved models and planning tools for designing naval minefields; these tools must provide the local commander with maximum flexibility in designing the minefield best suited for his needs
 - identification of effective and affordable mine designs for use in littoral environments; these designs must emphasize the use of modern technology for remote control of minefields, highly accurate location of mines within the field, robust performance in regional environment, and ease of delivery to the operational site
- The reinvigorated program should focus on keeping the U.S. Navy in the business of building naval mines, not on acquisition of specified inventories designed to fit specified scenarios. The lessons learned during the Cold War, when the United States had the luxury of preparing for a war the characteristics of which were generally agreed upon by both sides, must now be unlearned.

SUPPLEMENTAL DOCUMENTS TO STUDY OF U.S. NAVAL MINES

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